IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re re-issue application of: Danamichele Brennen O'Brien

Application No.: 09/706,194 Group No.: 2166

Filed: 11/03/2000 Examiner: RIMELL, SAMUEL G

U. S. Patent No.: 5,832,453 ('453 patent)

For: COMPUTER SYSTEM AND METHOD FOR DETERMINING A TRAVEL SCHEME MINIMIZING TRAVEL COSTS FOR AN ORGANIZATION

Box Reissue
Assistant Commissioner for Patents
Washington, D. C. 20231

TRANSMITTAL

Transmitted herewith:

1) Protest Under 37 C.F.R. § 1.291(a)

2) Protest Claims Chart

3) PTO/SB/08A and PTO/SB/08B with thirteen (13) references

4) Acknowledgement of Receipt/Return Card

Respectfully submitted,

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PATENT

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PROTEST UNDER 37 C.F.R. section 1.291(a)
IDENTIFICATION OF APPLICATION

1. This is a protest against the above identified pending re-issue application.

LISTING OF INFORMATION RELIED ON

2. Listed below are the patents, publications or other information relied upon. Form PTO-1449 (PTO/SB/08A and 08B), listing the patents and publications, is also attached.

a) United States Patent 5,224,034 issued to Katz, et al. for an" Automated System For Generating Procurement Lists", Issue Date of June 29, 1993, file date of December 21, 1990.

b) James C. Bean & John R. Birge. "Reducing Travelling Costs And Player Fatigue In The National Basketball Association", Interfaces, Vol. 10, No. 3, pp. 98-102, June 1980.

c) Bruce L. Jackson & John Michael Brown. "Using LP For Crude Oil Sales At Elk Hills: A Case Study", Interfaces, Volume 10, No. 3, pp. 65-71, June 1980.

d) Ian Turner. "An Independent System for the Evaluation of Contract Tenders", J. Opl Res. Soc., Vol. 39, No. 6, pp. 551-561, 1988.

1. In a computer system having a data input device, a data storage device, and a processor, a method for determining a travel scheme for minimizing travel costs for an organization, where the organization expects to purchase travel trips for a plurality of travelers for a plurality of predetermined travel links, each travel link comprising a travel origin and a travel destination, each travel link being served by at least one of a plurality of travel carriers, the method comprising the steps of:	1. **Bean** discloses the use of mathematical programming including linear programming to reduce an organization's travel costs. **Jackson** discloses the use of mathematical programming to optimize revenue generation from oil sales given a maximum single purchaser constraint. **Turner** discloses the use of mathematical programming including linear programming to allocate business in a multi-vendor, volume discount environment. **Katz** describes, in a computer system having a data input device, a data storage device, and a processor, a method for determining a scheme to minimize an organization's purchase costs in a volume discount environment, described therein as the Procurement Decision Support System ("PDSS"). PDSS is described in more detail in **Tendick** and **Sadrian,** and appears to be further described in **Katz Patent**. A similar system is described in **Chaudhry**. **Chaudhry** is applicable to all references to **Katz**, **Tendick**, and **Sadrian** in the following analysis. These articles all disclose the use of a computer system to implement mathematical programming techniques to minimize an organization's purchasing costs in a volume discount environment: the claims of the '453 patent do no more than the same thing, but with respect to an organization's purchases of travel trips. As described in **Katz Patent** and **Sadrian**, PDSS used mixed integer programming, specifically linear programming, to minimize an organization's procurement costs, including constructing an objective function, constructing constraints and applying the constraints to the objective function to determine a solution of the objective function that satisfies the constraints. These terms have the same meaning in mixed integer programming as they do in linear programming. (a) **Bean** discloses the use of linear programming to reduce an organization's travel costs, (b) **Sadrian** and **Katz Patent** (col 8, lines 54-59) disclose PDSS's use of Lindo, which runs a linear program, so its disclosure is inherent in **Katz**, and (c) the use of a linear program where the problem is linear in nature, such as that disclosed in the '453 Patent is an obvious choice. The '453 patent also uses linear programming software from Lindo Systems (col 11, lines 16-19). Moreover, a similar system to PDSS, which refers to linear programming, is disclosed in **Chaudhry**.
.....	.....
obtaining travel information relating to the carriers and the links via the data input device;	- **Katz** discloses use of data input device. (**Katz** at 26 and 27; **Tendick** at 56; **Sadrian** at 21; **Katz Patent** at col. 3, lns. 1-10, col. 6, lns. 15-16; and claims). **Bean** refers to travel links. (**Bean** at 98). **Katz** discloses obtaining an organization's volume

	discount contracts with suppliers, as well as other information analogous to travel information: forecasting product demand, obtaining pricing, limits on vendor capacity. (**Katz** at 24). **Katz Patent** discloses obtaining pricing information relating to suppliers. (**Katz Patent** Figs. 1& 2).
storing the travel information via the data storage device;	-**Tendick** discloses storage of the above information via a data storage device. (**Tendick** at 56). **Katz Patent** discloses storing pricing information relating to suppliers. (**Katz Patent** Fig. 1 (# 130, #140) &FIG. 2 (#220, #230, #240)).
constructing an objective function from the travel information via the processor, the objective function representing a travel cost to the organization to purchase travel trips for the plurality of travelers for the plurality of predetermined links;	-**Bean** refers to the organization's travel costs for purchasing travel trips for the plurality of travelers for the plurality of predetermined links. (**Bean** at 98). **Bean** describes the travel costs to the organization as linear in nature; (**Bean** at 98). **Katz** discloses a system to minimize the organization's total purchasing costs for a given commodity. (**Katz** at 24, **Katz Patent** Fig. 1, #123).
constructing a set of constraints from the travel information via the processor, the constraints comprising restrictions relating to the objective function;	- **Katz** and **Sadrian** describe PDSS's use of constraint's including those derived from the organization's volume discount contracts, i.e. previously negotiated purchase incentives. (**Katz** at 26; **Sadrian** at 16, 19-20). - **Katz Patent** discloses input of constraints and subsequent processing using those constraints. (**Katz Patent** at col 6, lines 66, Fig. 1, # 122)
applying the constraints to the objective function via the processor to determine a solution of the objective function that satisfies the constraints and that minimizes the travel costs of the organization; and	- **Katz** and **Sadrian** describe PDSS's application of constraints to the organization's purchasing costs (objective function) to determine a solution that satisfies the constraints and minimizes the organizations purchasing costs. (**Katz** at 26; **Sadrian** at 18). - **Katz** and **Sadrian** describe PDSS's minimization of the organization's purchasing costs as the lowest value of the objective function subject to the given constraints. (**Katz** at 24; **Sadrian** at 18, **Katz Patent** Fig. 2, #250, and claim 2, col 10)
applying the solution as the travel scheme for minimizing travel costs by purchasing travel trips in accordance with the solution.	- **Katz** and **Sadrian** refer to making purchases based on the solution provided by the use of the PDSS. (**Katz** at 24; **Sadrian** at 15, 21-22). **Katz** and **Sadrian** refer to communication of the purchasing scheme to the procurement manager through reports generated by the PDSS printer and/or screen, and to making purchases. (**Katz** at 24; **Sadrian** at 15, 21-22).

The attached claim chart demonstrates that every claim of the '453 patent reissue application is anticipated by a combination of the prior art in the same manner as that set forth above

e) Paul Katz, Amir Sadrian & Vern Williams. "Making The Most Of A Telephone Company's Purchasing Power", Bellcore Exchange, pp. 23-27, March/April 1990.

f) Paul Katz, Amir Sadrian & Patrick Tendick. "Telephone Companies Analyze Price Quotations With Bellcore's PDSS Software", Interfaces, Volume 24, No. 1, pp. 50-63, January/February 1994 (see page 51 "At the time of this writing, Bellcore is developing PDSS Version 5.0, to be released in December of 1993.")

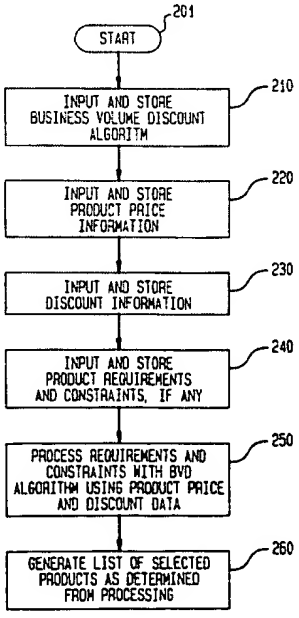
g) Amir A. Sadrian & Yong S. Yoon. "A Procurement Decision Support System In Business Volume Discount Environments", Operations Research, Vol. 42, No. 1, pp. 14-23, January/February 1994 (Received March 1991; Revision Received August 1993; Accepted August 1993).

h) E. William Moore, Jr., Janice M Warmke & Lonny R. Gorban. "The Indispensable Role Of Management Science In Centralizing Freight Operations At Reynolds Metals Company", Interfaces, Vol. 21, No. 1, pp. 107-129, January/February 1991.

i) Amir A. Sadrian & Yong S. Yoon. "Business Volume Discount: A New Perspective On Discount Pricing Strategy", International Journal of Purchasing and Materials Management, Vol. 28, No. 2, pp. 43-46, Spring 1992.

j) Sohail S. Chaudhry, Frank G. Forst & James L. Zydiak. "Vendor Selection With Price Breaks", European Journal of Operational Research, Vol. 70, pp. 52-66, 1993 (Received January 1991; revised November 1991).

3. A concise explanation of the relevance of each listed item follows:



a) United States Patent 5,224,034 issued to Katz, et al. for an "Automated System For Generating Procurement Lists", Issue Date of June 29, 1993, file date of December 21, 1990 (hereinafter "**Katz Patent**"). **Katz Patent** appears to describe a Procurement Decision Support System computer system (described in more detail below) that was in use since at least 1990. **Katz Patent** describes a method and computer system for automatically providing a purchasing manager with a report listing the type and number of products to be purchased from various vendors as well as an allocation of costs to the vendors supplying the products resulting in an organizations reduction of procurement costs in a multi-vendor, volume discount environment. **Katz Patent** describes the general problem of determining the best overall procurement strategy even though that may involve more expensive individual purchases, i.e., one which minimizes total purchasing costs. **Katz Patent** discloses the steps of: obtaining pricing and discount information (220, 230); obtaining product requirements and constraints (240); processing requirements and constraints using product price and discount data (250);

and providing a list of selected products as determined from processing (260). **Katz Patent** is relevant in that it discloses the steps followed in solving the general problem of an organization's purchase requirements subject to volume discount pricing. **Katz Patent** also specifically disclosed the apparent paradox recognized by inventor O'Brien, "For this reason, it is not always advantageous to buy a product from the vendor offering that product for the lowest price. Rather, it may be better to purchase from a nominally more expensive vendor in order to move into a higher discount bracket for that vendor." col 4, line 66 – col 5, line 3. Further, **Katz Patent** appears to describe the PDSS computer system disclosed in **Katz, Tendick**, and **Sadrian**. The **Katz Patent** is relevant in that it discloses the use of linear programming to minimize an organization's purchasing costs in a multi-vendor volume discount environment including constructing a set of constraints, constructing an objective function and applying the constraints to the objective function to determine a solution of the objective function that satisfies the constraints and minimizes the costs of the organization.

b) James C. Bean & John R. Birge. "Reducing Travelling Costs And Player Fatigue In The National Basketball Association", Interfaces, Vol. 10, No. 3, pp. 98-102, June 1980 (hereinafter "**Bean**"). **Bean** discloses travel optimization methods to minimize travel costs of the National Basketball Association. **Bean** points out that finding an optimal travel schedule can be formulated as either a combinatorial or linear programming problem. **Bean** is relevant in that it teaches the use of mathematical programming techniques, such as linear programming, in reducing an organization's travel costs.

c) Bruce L. Jackson & John Michael Brown. "Using LP For Crude Oil Sales At Elk Hills: A Case Study", Interfaces, Volume 10, No. 3, pp. 65-71, June 1980 (hereinafter "**Jackson**"). The claims of the '453 patent and the reissue application all disclose the same basic sequence of steps: 1) Obtaining travel information; 2) constructing an objective function; 3) constructing a set of constraints; 4) applying the constraints to the objective function to determine a solution of the objective function that satisfies the constraints and that minimizes the travel costs of the organization. **Jackson** discloses methods for solving the inverse objective: the use of linear programming methods for assuring overall revenue optimization in selling oil. **Jackson** discloses the following steps: 2) constructing an objective function (maximizing revenue); 3) constructing a set of constraints representing the maximum quantity of oil deliverable to any single purchaser; and 4) applying the constraints to the objective function to determine a solution of the objective function that satisfies the constraints and that maximizes revenue generation. **Jackson** is relevant in that it discloses a method containing elements of the claimed O'Brien invention.

d) Ian Turner. "An Independent System for the Evaluation of Contract Tenders", J. Opl Res. Soc., Vol. 39, No. 6, pp. 551-561, 1988 (hereinafter "**Turner**"). **Turner** discloses the use of linear programming and a quasi-optimizing routine in order to maximize organization purchasing optimization among multiple machinery suppliers. **Turner** discloses the following steps: 1) obtaining supplier information, 2) constructing an objective function; 3) constructing constraints (supply and goal constraints); and 4) applying the constraints to the objective function to determine a solution of the objective function that satisfies the constraints and that minimizes the supplier cost of the organization. **Turner** is relevant in that it discloses elements of the claimed O'Brien invention.

e) Paul Katz, Amir Sadrian & Vern Williams. "Making The Most Of A Telephone Company's Purchasing Power", Bellcore Exchange, pp. 23-27, March/April 1990 (hereinafter "**Katz**"). **Katz** describes a computer system (and the underlying method) for determining a scheme to minimize an organization's purchase costs in a volume discount environment. The computer system is known as Procurement Decision Support System (hereinafter "PDSS"). The computer system embodies the following steps: 1) obtaining product pricing, vendor volume discount information, and demand information; 2) inherent in the system is construction of an objective function of determining the most economical purchasing strategy; 3) constructing constraints (setting parameters such as supplier-capacity limits); 4) determining the most economical purchasing strategy, and providing a report to be used in procurement. **Katz** is relevant in that it describes a computer system for minimizing an organizations costs containing elements of the claimed O'Brien invention.

f) Paul Katz, Amir Sadrian & Patrick Tendick. "Telephone Companies Analyze Price Quotations With Bellcore's PDSS Software", Interfaces, Volume 24, No. 1, pp. 50-63, January/February 1994 (see page 51 "In December of 1989, Bellcore delivered PDSS (procurement decision support system).... At the time of this writing, Bellcore is developing PDSS Version 5.0, to be released in December of 1993.") (hereinafter "**Tendick**"). **Tendick** further describes PDSS, as discussed above in **Katz Patent** and **Katz**. **Tendick** identifies the general problem of procurement optimization in a multi-vendor, volume discount environment. **Tendick** then describes the solution through the use of PDSS. **Tendick** then goes on to specifically note that "[t]here is nothing in PDSS that is specific to local exchange carriers or the telecommunications industry" suggesting application of the system and its underlying method to a variety of industries. **Tendick** is relevant under 35 U.S.C. § 102(a) in that it further describes the PDSS computer system that was in use since at least 1990.

g) Amir A. Sadrian & Yong S. Yoon. "A Procurement Decision Support System In Business Volume Discount Environments", Operations Research, Vol. 42, No. 1, pp. 14-23, January/February 1994 (Received March 1991; Revision Received August 1993; Accepted August 1993) (hereinafter "**Sadrian**"). **Sadrian**, in further describing the PDSS computer system, notes that PDSS has been specifically developed to deal with the multi-vendor volume discount procurement problem. **Sadrian** is also relevant under 35 U.S.C. § 102(a) in that it further describes the PDSS computer system, as discussed above in **Katz Patent** and **Katz**, that was in use since at least 1990.

h) E. William Moore, Jr., Janice M Warmke & Lonny R. Gorban. "The Indispensable Role Of Management Science In Centralizing Freight Operations At Reynolds Metals Company", Interfaces, Vol. 21, No. 1, pp. 107-129, January/February 1991 (hereinafter "**Moore**"). **Moore** describes the use of mixed integer programming for minimizing organizational cost in a multi-vendor service (freight carriers) environment. **Moore** discloses a computer system embodying the following steps: 1) obtaining carrier information; 2) creating an objective function (globally minimize central dispatch freight costs); 3) constructing constraints (costs, shipping demands, maximum number of carriers, and carrier imposed limits); 4) applying the constraints to the objective function to determine a solution of the objective function that satisfies the constraints and that minimizes the shipping cost of the organization. **Moore** is relevant in that it describes a computer system embodying elements of the claimed O'Brien invention.

i) Amir A. Sadrian & Yong S. Yoon. "Business Volume Discount: A New Perspective On Discount Pricing Strategy", International Journal of Purchasing and Materials Management, Vol. 28, No. 2, pp. 43-46, Spring 1992 (hereinafter "**Yoon**"). **Yoon** discloses a strategy for developing discount pricing schedules in a volume discount environment. **Yoon** is relevant in that it describes the general problem sought to be solved by the applicant of minimizing procurement costs in a multi vendor, volume discount environment. **Yoon** notes the heavy computational burden of analyzing data such as forecasting demand, supplier pricing and volume discounts and **Yoon** also notes the recent developments in computer hardware and software making this analysis possible.

j) Sohail S. Chaudhry, Frank G. Forst & James L. Zydiak. "Vendor Selection With Price Breaks", European Journal of Operational Research, Vol. 70, pp. 52-66, 1993 (hereinafter "**Chaudhry**"). **Chaudhry** discloses linear and mixed binary integer programming models for minimizing organizational purchasing cost in a multi-vendor environment. **Chaudhry** is relevant under 35 U.S.C. § 102(a) in that it describes the general steps followed in solving the general problem of an organization's purchase requirements subject to volume discount contracts.

4. A claims chart is attached showing the relevance of the listed items with regards to each of the claims of the re-issue patent application.

5. An expert opinion is attached entitled "Expert Report of Bernard A. Galler Concerning The Invalidity of U.S. Patent No. 5,832,453" by Bernard A. Galler (hereinafter "**Galler Opinion**").

6. An expert opinion is attached entitled "Analysis Of Rosenbluth, Inc. Patent 5,832,453" by Kipp Martin (hereinafter "**Martin Opinion**").

7. A **Markman Ruling** opinion construing the '453 patent is attached entitled "Memorandum Of Opinion Construing United States Patent No. 5,832,453" (hereinafter "**Markman Ruling**").

PRELIMINARY STATEMENT

8. It is protestor's belief that independent claims 141, 166, 168, 169, and 170 are the broadest claims of the '453 patent reissue application.

9. The claimed O'Brien invention is not patentable under 35. U.S.C. § 103. As set forth in the disclosure, the problem purported to be solved by the '453 patent is the minimization of an organization's travel costs. Indeed, the patent discloses the problems sought to be solved as follows:

> The present invention relates to a computer system and a method for determining the distribution of transportation carrier support that will result in the lowest total travel cost for an organization. ['453 patent col. 1 lns. 8-10]
>
> Thus, it would be highly advantageous to have a system and method for organizing a coherent travel scheme based on the organization's travel demands, the negotiated travel incentives the organization has with particular travel carriers, and the service

> each travel carrier provides between particular travel locations, as well as several other factors, in order to minimize the total travel cost incurred by the organization. ['453 patent col. 1 lns. 41-47]

In the prosecution of the '453 patent, the applicant made clear that the key to the claimed invention is that it purports to minimize an organization's travel costs subject to the constraints of its volume discount arrangements with travel carriers, which are based on the organization meeting certain volume or monetary goals:

> [In response to an office action dated May 25, 1995, applicant stated at pages 6-7] The Examiner states with regard to claims 1, 18 and 54 that it is not clear from the method how travel costs are necessarily minimized as recited since the application of constraints can lead to a selection of more costly options. Applicant respectfully points out that the apparent paradox noted by the Examiner is central to the benefit obtained by the present invention. More specifically, the present invention realizes that the overall cost of a plurality of travel transactions may be decreased if the individual cost of one or more particular travel transactions is increased.
>
> Although this is counter-intuitive, it should be realized that in the travel industry, travel carriers routinely grant large organizational customers volume discounts, but only if, for example, a certain dollar amount of travel is purchased, or a certain number of seats are purchased. Accordingly, it may be worthwhile to pay an increased travel cost to a particular travel carrier (as compared with a competing carrier) so that the dollar goal necessary to obtain the discount from that carrier is achieved. Correspondingly, it may be worthwhile to purchase a more expensive seat from a particular travel carrier (as compared with a competing carrier) so that the seat goal necessary to obtain the discount from that carrier is achieved. Of course, this assumes that the higher cost is more than offset by the gain achieved from the discount. Accordingly, it is indeed possible to minimize an organization's overall travel cost by selecting particular travel options that are more costly when compared to the competition for that particular travel option. (Emphasis in original)
>
> Further, the specification states at col 1, line 61 – col 2, line 2, The system *constructs an objective function* and *a set of constraints* from the travel information. The objective function represents a travel cost to the organization to purchase trips for the plurality of travelers for the plurality of predetermined links, and the constraint comprise restrictions relating to the objective function. The *constraints are applied to the objective function to determine a solution of the objective function* that satisfies the constraints and that minimizes the travel costs of the organization. (Emphasis added)

Based on the prosecution history of the '453 patent, it is incontestable that a person of skill in the art would consult literature in the field of mathematical programming, particularly linear programming, in order to address this problem.

The attached **Markman Ruling** further supports the proposition that a person of skill in the art would consult literature in the field of mathematical programming. Ten (10) terms of the '453 patent were contested in the **Markman Ruling**: (1) "constructing an objective function"; (2) "constructing constraints"; (3) "applying the constraints to the objective function to determine a solution of the objective function that satisfies the constraints"; (4) "minimize"; (5) "optimum"; (6) "objective function"; (7) "constraints"; (8) "travel information"; (9) "solution of the objective function"; and (10) "applying the solution". The court construed six (6) terms of the '453 patent as being directed to the field of mathematical programming; specifically linear programming: "construction an objective function", "constructing constraints", "applying the constraints to the objective function to determine a solution of the objective function that satisfies the constraints", "minimize", "optimum" and "objective function".

Further, the court recognized that when, as in this case, "the preferred embodiment is described in the specification as the invention itself, the claims are not necessarily entitled to a scope broader than that embodiment." Modine Mfg. Co. v. United States ITC, 75 F.3d 1545, 1551 (Fed. Cir. 1996) **Markman Ruling** p. 12. The court also recognized that the '453 Patent presumes linear programming will be used and that it is central to the invention. **Markman Ruling** pp. 12-14.

The attached expert opinions also support the proposition that a person of skill in the art would consult literature in the field of mathematical programming. The **Galler Opinion** states that "a person skilled in the art would certainly review literature from the field of mathematical programming in order to try to determine a model which provides a solution" to minimize an organization's travel costs. **Galler Opinion**, Para. 10.

> A person skilled in the art seeking information concerning the minimization of travel costs incurred in purchasing travel trips in which the suppliers offer volume discounts would find many articles which describe the use of linear programming to solve well-known optimization problems. Such a person would also find **Bean**, which counsel for Travel Analytics has directed to my attention, and in which a linear program solution is formulated, although considered infeasible with the technology then available. Such literature, which refers to travel and the reduction of travel costs, provides the suggestion to a person skilled in the art that mathematical programming techniques including linear programming are appropriate methods to minimize such travel costs. **Galler Opinion**, Para. 11.

The **Galler Opinion** continues:

> ...a person skilled in the art would search for literature involving the use of mathematical programming techniques to minimize organizations' purchasing costs when they have volume discount contracts with suppliers...because the purchase of travel trips

> subject to the requirements of volume discount requirements is simply a specific instance of the more general problem of an organization's purchase requirements subject to volume discount contracts. **Galler Opinion**, Para. 12.

The **Galler Opinion** concluded: It would have been obvious to one skilled in the art to combine (1) the teaching of articles teaching that mathematical programming techniques including linear programming are appropriate for reducing organizations' travel costs with (2) the articles teaching that such programs are appropriate to minimize organizations' purchasing and shipping costs subject to volume discount contracts. Para. 12.

The **Martin Opinion** supports the proposition that the purchase of travel trips subject to the requirements of volume discount requirements is simply a specific instance of the more general problem of an organization's purchase requirements subject to volume discount contracts:

> ...the methodology claimed in [the '453 Patent] is almost identical to, and a special case of, methodology implemented earlier by the Reynolds Metals Company (**Moore**) and the British Coal Company (**Turner**). The small differences between [the '453 Patent] and the Reynolds and British Coal models would be obvious to any reasonably skilled practitioner. **Martin Opinion**, Sec. 1.

The **Martin Opinion** notes that the '453 patent "is based on a concept that is very well known, and is very precisely defined in the operations research literature. This concept is a *constrained optimization model.*". **Martin Opinion**, Sec. 2. The constrained optimization model has three key components: 1) decision variables; 2) an objective function; and 3) constraints. *See* **Martin Opinion**, Sec. 2. The **Martin Opinion** continues in explaining the art:

> Perhaps the most widely used type of constrained optimization model is the *linear program.* A linear program is a constrained optimization model in which the objective function and all of the constraints are linear functions. ... An important generic class of linear programs is the constrained transportation problem. ... In a nutshell, assume there are origin cities and destination cities. You are required to ship something (e.g. products, people, trucks,) from each of the origin cities to the destination cities. There are multiple carriers (e.g. trucking companies, airlines) you can select from. There is a cost associated with using each carrier on each origin-destination link. The mathematical solution to the constrained transportation problem provides a minimum cost selection of carriers in order to meet the demand on each link without exceeding the carrier availability (or possibly guaranteeing each carrier a certain amount of business) at each link.

The **Martin Opinion** also notes that the '453 Patent claims an algebraic model that is nothing more than a "special case of the" model described in **Moore. Martin Opinion,** Sec. 3. The model described in **Moore**

> has been used in a business logistics course at the Graduate School of Business (reading number 9717, in the Spring 97 Packet for course Bus466-81), University of Chicago. The Model described [in the '453 patent] is so obvious that I feel confident that after reading this packet article, an MBA student when given a detailed description of the travel problem faced by Rosenbluth, Inc. could come up with the formulation described in [the '453 patent] **Martin Opinion**, Sec. 3.

The **Martin Opinion** also considered the model described in **Turner**:

> The British Coal Company does what Rosenbluth does - they construct the model with the rebated (discounted) prices in the objective function and then add constraints . . . that say they have to do enough business with a supplier to get the rebate. The mathematical structure of the British Coal problem is virtually identical to Rosenbluth. Any difference would be obvious to a practitioner reasonably skilled in the art of mathematical model formulation. **Martin Opinion**, Sec. 4.

As described in more detail below, the same teaching, which the Applicant described as "central to the benefit" of the claimed invention, existed in the relevant art prior to the claimed date of invention, for example, see **Katz Patent**, col 4, line 66 – col 5, line 3.

A person of skill in the art who had consulted literature in the field of mathematical programming prior to the date of the O'Brien invention for information concerning the minimization of travel costs would find numerous references to the use of linear programming to solve the well known "traveling salesman problem." Perhaps more importantly, a person of skill in the art would find **Bean**. **Bean** refers to different forms of mathematical programming, including linear programming. Accordingly, a review of either **Bean** or literature regarding the well known traveling salesman problem would doubtless suggest to a person of skill in the art to consult references in those fields to determine how to minimize an organization's travel costs.

A person of skill in the art researching in the field of mathematical programming would find numerous technical articles published prior to the invention date which describe systems that enable organizations to minimize their purchasing costs subjects to constraints that include volume purchase requirements in order to qualify for volume discounts. *See* **Katz**, **Chaudhry**, **Sadrian**, and **Yoon**. Reviewed in light of its stated objects and admissions in the prosecution, it is plain that the '453 patent discloses no more than a system which purports to enable an organization to minimize its purchasing costs subject to constraints that include volume purchase requirements in order to qualify for volume discounts, *i.e.*, the "apparent paradox", as disclosed in **Katz Patent** which is "central to the benefit" of the alleged invention, for purchases of travel trips.

A comparison of Claim 1 of the '453 patent to the disclosures in the above-referenced articles illustrates that the '453 patent's purported system to minimize an organization's cost to purchase travel trips is disclosed either solely by the prior art literature concerning the minimization of an organization's purchasing costs generally, or in combination with the prior art which teaches the use of linear programming and other mathematical programming techniques to reduce an organization's travel costs:

with respect to Claim 1. For the reasons set forth above, the claims of the '453 patent reissue application should be rejected pursuant to 35 U.S.C. § 103 as obvious in view of the prior art.

10. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness arguments set forth herein:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-172 should be rejected under 35 U.S.C. § 103 (a) as being unpatentable over **Bean**. **Bean** teaches a method for reducing the traveling costs of an organization using either combinatorial or linear programming. The method disclosed in **Bean** includes the following steps: 1) information is obtained concerning the travel requirements of the NBA; 2) an objective function of minimizing travel time and cost for a determined amount of travel is constructed; 3) multiple constraints are constructed; and 4) the constraints are applied to the objective function in order to determine a solution of the objective function that satisfies constraints and that minimizes the NBA's travel costs. It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to utilize linear programming to reduce an organization's travel costs, as taught by **Bean**.

11. Claims 1-172 should be rejected under 35 U.S.C. § 103(a) as being unpatentable over **Bean** in view of **Moore. Bean** teaches a method for reducing the traveling costs of an organization using either combinatorial or linear programming. **Bean** suggests to a person of skill in the art to consult references in mathematics, including **Moore,** to determine how to minimize an organization's travel costs. **Moore** discloses the use of linear programming to minimize an organization's transportation cost. The method described in **Moore** includes the steps of: 1) obtaining carrier information; 2) constructing an objective function; 3) constructing carrier goal constraints; 4) applying the constraints to the objective function; and providing the results of the analysis. It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to utilize the method of linear programming disclosed in **Moore** to reduce an organization's travel costs.

12. Claims 1-172 should be rejected under 35 U.S.C. § 103(a) as being unpatentable over **Katz Patent** in view of **Bean**. **Katz Patent** teaches a method and computer system for reducing procurement costs in the business volume discount regime. The method and computer system disclosed in **Katz Patent** includes the following steps: 1) obtaining pricing and discount information; 2) obtaining product requirements; 3) constraints; 4) processing requirements and constraints using product price and discount data; and providing a list of selected products as determined from processing. **Bean** teaches a method for reducing the traveling costs of an organization using either combinatorial or linear programming. **Bean** suggests to a person of skill in the art to consult references in mathematics, including **Katz Patent,** to determine how to minimize an organization's travel costs. It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to utilize the method of linear programming disclosed in **Katz Patent** to reduce an organization's travel costs, as taught by **Bean**.

13. Claims 1-172 should be rejected under 35 U.S.C. § 103(a) as being unpatentable over **Turner** in view of **Bean**. **Turner** teaches the use of linear programming and a quasi-optimizing routine in order to maximize organization purchasing optimization among multiple machinery suppliers. The method disclosed in **Turner** includes the following steps: 1) obtaining supplier information; 2) constructing an objective function; 3) constructing constraints (supply and goal constraints); and 4) applying the constraints to the objective function to determine a solution of the objective function that satisfies the constraints and that minimizes the supplier cost of the organization. **Bean** teaches a method for reducing the traveling costs of an organization using either combinatorial or linear programming. **Bean** suggests to a person of skill in the art to consult references in mathematics, including **Turner,** to determine how to minimize an organization's travel costs. It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to utilize the method of linear programming disclosed in **Turner** to reduce an organization's travel costs, as taught by **Bean**.

14. The claims are invalid as not enabling under 35 U.S.C. § 112, first paragraph. In the '453 patent prosecution, in order to overcome a rejection for indefiniteness, the Applicant conceded that the claims of the original application were directed to the application of linear programming to the problem of minimizing an organization's travel costs.

In the Examiner's first action in response to the application, dated May 25, 1995, she objected to the specification of the application under 35 U.S.C. § 112, for failing to provide either an adequate written description or enabling disclosure of the invention. Among other problems, the Examiner highlighted the Applicant's failure to adequately disclose linear programming software in the patent:

> [In an office action dated May 25, 1995, the Examiner stated at pages 5-6] Further, with regard to the extraction of information from the spreadsheet, the construction of the objective function and constraints from the extracted information and the use of "linear programming" for applying the constraints to the objective function to determine a solution, Applicant only presents this as desired results without providing the necessary processing or flow charts needed to teach such operations. Note page 19, lines 12+ of the instant specification which only generally describe the operations. The specification repeatedly mentions "the linear programming software" but provides no specific disclosure of the content thereof... . Moreover, as the linear programming software appears to be *essential material* to the disclosed and claimed invention, i.e. *it is required for the system or method to perform as stated,* and as Applicant is not relying on patent documents for support, such subject matter cannot be incorporated by reference. (Emphasis added)

The Applicant's response unambiguously admitted that the claims of her application were "directed toward the application of linear programming to the problem of minimizing travel costs for an organization." Office action response dated August 28, 1995.

> Moreover, Applicant respectfully points out that the application of linear programming is merely one step or part of the present invention, and that *the claims of the present invention are di-*

> *rected toward the application of linear programming* to the problem of minimizing travel costs for an organization and to the particular arrangement of elements and steps that facilitate the employment of the linear programming. Office action response dated August 28, 1995. (Emphasis added)

Based on the prosecution history of the '453 patent, applicant has stated that the claims of the '453 Patent reissue application are directed toward the application of linear programming. The attached **Markman Ruling** further supports the proposition that the claims of the '453 Patent reissue application are directed toward the application of linear programming. As noted above the court construed terms contained in the claims of the '453 patent as being directed to the field of linear programming. Linear programming is the only method that the applicant has disclosed in the '453 patent. When, "the preferred embodiment is described in the specification as the invention itself, the claims are not necessarily entitled to a scope broader than that embodiment." Modine Mfg. Co. v. United States ITC, 75 F.3d 1545 (Fed. Cir. 1996)

The Manual of Patent Examining Procedure states that "A claim which omits matter disclosed to be essential to the invention as described in the specification or in other statements of record may be rejected under 35 U.S.C. § 112, first paragraph, as not enabling". *Manual of Patent Examining Procedure*, § 2172.01, 2100-193 (hereinafter "MPEP"). *In re Mayhew,* 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). The claims of the '453 Patent reissue application omit linear programming which is essential to the invention as described in both the specification and other statements of record.

For the reasons set forth above, the claims of the '453 patent reissue application must be amended to include linear programming.

15. The following is a quotation of 35 U.S.C. § 112, first paragraph, which forms the basis for all enablement arguments set forth herein:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 54, 124, 141, 160, 166, 168, 169, and 170 are invalid under 35 U.S.C. § 112, first paragraph, as not enabling, and as failing to comply with the written description requirement. These claims require no construction of an objective function, nor do they require application of constraints to an objective function to determine a solution of the objective function. The specification of the '453 Patent reissue application *only* discloses the use of linear programming – linear programming necessitates both the construction of an objective function and the application of constraints to an objective function. The written description of the '453 patent teaches *only* a system and method employing an objective function,. '453 Patent, col. 9, ln 15. Both the construction of an objective function and the application of constraints to an objective function are essential elements of the claimed invention. As previously noted, "claim[s] which omit matter disclosed to be essential to the invention as described in the specification or in other statements of record may be rejected under 35 U.S.C. § 112, first paragraph, as not enabling". *MPEP*, §

2172.01, 2100-193. *In re Mayhew,* 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). "A claim that omits an element which applicant describes as an essential or critical feature of the invention originally disclosed does not comply with the written description requirement." *MPEP,* § 2163(I)(B), 2100-158. *See Gentry Gallery , Inc. v. Berkline Corp.,* 134 F.3d 1473, 45 USPQ2d 1498 (Fed. Cir. 1998).

16. Claims 1-172 should be amended to include linear programming as a clamed element in order to comply with the enablement requirement of 35 U.S.C. § 112, first paragraph. The claims of the '453 Patent reissue application omit linear programming which is essential to the invention as described in both the specification and other statements of record, including Applicant's response to an office action dated August 28, 1995.

17. Claims 54, 124, 141, 160, 166, 168, 169, and 170 should be rejected under 35 U.S.C. § 112, first paragraph, as not enabling. These claims require no construction of an objective function, nor do they require application of constraints to an objective function to determine a solution of the objective function, both being essential elements of the disclosed invention. The specification does not disclose a method of determining a travel scheme for minimizing travel costs for an organization that can be performed *without* constructing an objective function or *without* applying the constraints to an objective function to determine a solution of the objective function.

18. Claims 54, 124, 141, 160, 166, 168, 169, and 170 should be rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. These claims require no construction of an objective function, nor do they require application of constraints to an objective function to determine a solution of the objective function, both being essential elements of the disclosed invention. The specification does not disclose a method of determining a travel scheme for minimizing travel costs for an organization that can be performed without constructing an objective function or without applying the constraints to an objective function to determine a solution of the objective function.

19. Claims 171 and 172 should be rejected under 35 U.S.C. § 112, first paragraph as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Specifically, the phrase "goal programming model" does not appear, nor is it defined, in the specification. As shown in **Chaudhry**, p. 64, goal programming requires elements that are not described or discussed in the '453 re-issue application.

COPIES OF LISTED ITEMS

20. A copy of each listed patent or publication or other item of information in written form, or at least the pertinent portions thereof, is attached.

SERVICE OF PAPERS

21. Service of a complete copy of these papers was made by depositing copies of these papers with the United States Postal service on June 24, 2002, each with sufficient postage as first class mail in envelopes addressed to the following:

David A. Sasso
Akin, Gump, Strauss, Hauer & Feld, L.L.P.
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2005 Market Street – 22nd Floor
Philadelphia, PA 19103-7086

Rosenbluth International - World Headquarters
2401 Walnut Street
Philadelphia PA 19103

ACKNOWLEDGEMENT OF PROTEST BY PTO

22. Please acknowledge receipt of this protest by stamping and returning the attached self-addressed postcard.

IDENTIFICATION OF PROTESTOR

Date: June 24, 2002

Michael H. Minns

Signature of Protestor

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